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Disaster Governance and Hybrid Organizations: Accounting, Performance Challenges and Evacuee Housing

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Abstract

Purpose: This paper investigates how public/private hybrid and ambiguous organizations played pivotal roles in a governmental programme of housing reconstruction following a major earthquake in central Italy in 2009. Venturing beyond the boundaries of institutional isomorphism and using a Foucauldian approach, the longitudinal analysis seeks to illuminate accounting and performance challenges and provide insights to the calculative techniques associated with evacuee housing.

Design/methodology/approach: In 'act 1' the paper investigates the role of a consortium created during the recovery stage of the disaster to construct temporary housing. In 'act 2' attention shifts to consortia established for the reconstruction of buildings in devastated communities. The total observation period is 11 years. 31 semi-structured interviews were conducted with 15 key-actors. A broad range of official documents was also consulted.

Findings: In the immediate aftermath of the earthquake a comprehensive reporting system was established to facilitate the construction of 19 new towns for 15,000 evacuees. The mix of accountants, engineers and architects who developed the system and a building prototype evidences the assembly of diverse calculative techniques by different experts and the de-territorialization of subject disciplines. During reconstruction technologies of government included the introduction of standardized systems and vocabularies that homogenised administrative procedures among diverse experts.

Research implications: The paper provides academics and policy makers with insights to accounting, performance management and accountability in hybrid organizations in the largely unexplored realm of post-disaster evacuee housing. Further studies are needed to examine the politics of calculation in similar contexts.

Originality/value: The paper fills a gap in the literature by exploring the role played by individual experts working for hybrid organizations. Further, by exploring actual practices over an extended period of post-disaster recovery and reconstruction, the study highlights how experts intervened to solve problems at the meso-political level and at the micro-organizational level.

Key Words: Hybrid organizations, Governmentality, Disasters, Housing, Accounting, Calculation

1. Introduction

According to the United Nations Office for Disaster Risk Reduction, in recent decades geophysical events such as earthquakes and tsunamis have resulted in more deaths than any other form of disaster (UNISDR, 2018). The 563 earthquakes that took place between 1998 and 2017 killed 747,234 people and resulted in the injury, homelessness and displacement of numerous others. These seismic events affected 125 million people and resulted in economic losses of US$661 billion. An increasing feature of relief and recovery from geophysical and climate-related disasters is the key role played by hybrid organizations, structures and networks. The urgency, scale and complexity of disaster management demands multi-organisational collaboration (Hermansson, 2016; Parlak and Gunduz, 2015). In these crisis situations interdisciplinary expertise may be drawn from diverse institutions and individuals in the public, private and not-for-profit worlds (Coppola, 2015, pp. 461-680). Using a variety of documentary sources as well as interviews with key participants, the current study analyses the role of hybrid and ambiguous organizations in the Abruzzo region of Italy following a seismic event of magnitude 6.3 that occurred on 6 April 2009. This was “a moderate earthquake, albeit with immoderate effects” (Alexander, 2010, p. 327). It killed 308 people, injured 1,500 and left 67,500 homeless (Alexander, 2010, 2013; Costa and Simeone, 2009; Dante *et al.*, 2009). The costs of reconstruction were estimated at more than €13bn (Kieffer, 2013, p. 258).

Given the enormous public expenditure on reconstruction, their social impacts on territories and populations, and the attendant issues of accounting and accountability to which they give rise, it is surprising that natural disasters have received limited attention from the interdisciplinary accounting community. Among impediments to such research is accessing source material and the temporal distance from the initiating emergency and the completion of the process of reconstruction. The latter requires multi-year observations in a range of impacted spaces (Alexander, 2002; Birkland, 2006; Coppola, 2015; Sylves, 2008).

The current study seeks to make a number of interrelated contributions. Firstly, we aim to augment knowledge on the intersection between disaster government and hybrid organizations. Although a number of accounting studies in recent decades have investigated hybridisation processes and hybrid organizations in diverse contexts (Kurunmäki, 2004; Kurunmäki and Miller, 2006; Miller *et al.*, 2008; Thomasson, 2009; Grossi and Thomasson, 2015; Grossi *et al.*, 2017; Johanson and Vakkuri, 2017; Gebreiter and Hidayah, 2019), researchers have yet to explore the functioning of hybrid organizations in short and long-term humanitarian operations following natural disasters. In this study we initially focus, in 'act 1', on a consortium that was created one month after the focal earthquake to activate a national governmental programme for the urgent building of temporary housing. Attention later shifts, in 'act 2', to consortia formed to reconstruct buildings in devastated areas. These consortia requested public funds, and planned and coordinated reconstruction on behalf of their local communities. We report the results of longitudinal research that unveils accounting, performance challenges and evacuee housing calculations over the periods of post-earthquake recovery and reconstruction. By focusing our research on an extended period and by engaging with participants who occupied a wide range of roles, we seek to gain insights to "actual practices" (Grossi *et al.*, 2020, p. 271).

Secondly, another theme that deserves greater attention in the literature on hybridity, and where there have been calls for further insights, is the role played by individuals (Grossi *et al.*, 2017, p. 383). The current study will highlight how various experts effectively translated governmental programmes into practices during the emergency and reconstruction stages of the focal disaster. It will also seek to demonstrate how these individuals intervened to solve problems at the meso-political level and at the micro-organizational level (Johanson and Vakkuri, 2017).

Thirdly, we seek to augment the accounting literature on natural disasters. While a number of pioneering works have analysed accounting (Lai *et al.*, 2014; Sargiacomo *et al.*, 2014, Sargiacomo, 2015; Walker, 2014; Perkiss and Moerman, 2020) and accountability (Baker, 2014; Taylor *et al.*, 2014; Sciulli, 2018) issues in relation to these events, the role played by calculative practice in specific aspects of recovery and reconstruction (such as developing temporary and permanent housing solutions) has been limited (Quarantelli, 1982)[1].

A fourth intended contribution is theoretical. Most of the recent research on hybridity has been supported by institutional logics (Greenwood *et al*., 2010; Battilana and Lee, 2014; Argento *et al.*, 2016; Skelcher and Smith, 2017; Olsen *et al.*, 2017), and by variants of institutional theory such as historical institutionalism (Christensen, 2017), as well as by property rights theory (Vining and Weimer, 2016). Contrary to these theoretical preferences, and with the intention of going beyond the boundaries of institutional isomorphism (Grossi *et al.*, 2020), the current research adopts a Foucauldian approach. It seeks to augment prior studies on the "art of government" and the role of calculative practices as "technologies of government" (Foucault, 1991, 2007; Miller and Rose, 1990; Rose and Miller, 1992; Miller, 2001) by focussing on the mechanisms used in a longitudinal case of post-disaster management. We study the technologies deployed in the recovery and reconstruction of an impacted territory and its population.

We begin, in section 2, by describing our theoretical framing and stating the main assumptions that guide our study. Following this, in section 3, we briefly discuss our research methods and sources. In section 4 we provide background to the focal case by narrating the governmental responses to the emergency and the classification of territories and populations impacted by the earthquake. Section

[1] There have been exceptions in the wider social sciences where researchers have performed extended longitudinal studies of managerial and policy aspects of post-earthquake reconstruction (e.g., Haas, Kates and Bowden, 1977; Quarantelli, 1982; Spangle Associates, 1991; Arnold, 1993).

5 examines the first ‘act’ in our longitudinal analysis. This initially concerns the emergence of Consortium Forcase as a hybrid organization and proceeds to show how the recovery and reconstruction project was planned using a ‘building prototype design’. This section also discusses the main calculative practices and performance challenges that attended the planning, funding, construction, time-space reporting and controlling of new towns built to provide temporary housing for evacuees. Section 6 concerns the second ‘act’ in our longitudinal case. Here we investigate the nature and operation of reconstruction consortia established for the rebuilding of devastated homes and the attempt to provide permanent housing for evacuees. These actions required the concurrent deployment of accounting, administrative, architectural and engineering expertise. In Section 7 we offer a concluding discussion.

2. The art of government following a disaster

Much time has passed since studies in accounting began to explore the use of technologies of calculation in the government of organizations and societies. Such studies produced a number of contributions relating to historical (Miller, 1990; Neu, 2000; Walker, 2004; Servalli, 2013) and contemporary (Preston *et al.*, 1997; Radcliffe, 1999; Graham, 2010; Argento *et al.*, 2019) settings. Through this literature, the role of accounting in the government of populations became an established theme. More recently, attention has also focussed on the role of calculation in territorial strategies as well as population (Elden, 2007; Mennicken and Miller, 2012).

In his lectures on *Security, Territory and Population* given in 1978 Foucault (2007) sought to further explore the issue of government (Elden, 2007). He asserted that the emergence of the problem of population generated new technologies in the ‘art of government’ including calculative mechanisms such as statistics (Foucault, 2007, p. 67). He also recognised that population and territory were intertwined - the territory it inhabits is fundamental to comprehending a population. Foucault referred to instances where states 'policed' communities by first ascertaining their territories as well those who lived in them (2007, pp. 320-323). It follows that the government of both territory and population require calculative mechanisms. As Elden (2007) notes, the mapping, ordering and measurement of territory, as well as the manner in which territory is normalised and regulated are 'calculative'. Mennicken and Miller (2012, p. 4) argue that calculative instruments "transform not only the possibilities for personhood, they also construct the physical and abstract calculable spaces that individuals inhabit". Foucault's insights on the 'politics of habitat', the structuring of space and the construction and reconstruction of towns (Foucault, 2007, pp. 14-20), have also informed studies in human geography (Elden, 2016, pp. 87-92; Crampton and Elden, 2007, pp. 71-75).

It is worth noting that Foucault's observations on territory and population included brief consideration of the implications of disasters. He reflected on the state's protection of territories and populations from dangers and crises. He referred to how, historically, the problem of "population was posed in relation to the desert or desertification due to major human catastrophes" (2007, p. 67). Indeed, for Foucault (2007, p. 67) the emergence of the problem of ""population" was understood as the movement by which a deserted territory was repopulated after a great disaster, be it an epidemic, war, or food shortage…in which people died with spectacular rapidity and intensity". Foucault explained how the emphasis later shifted to preserving the security of the population, particularly at moments of crisis. From the eighteenth century, disruptive events such as epidemics became the subject of intervention not only in the form of medical treatments but also in the deployment of quantitative instruments to ascertain risk and measure mortality and morbidity (2007, pp. 58-62). In this way those impacted by such adversities were constructed as "a distribution of cases in a population circumscribed in time or space" (2007, p. 60). It is contended here that a Foucauldian framework offers insights to the government of disasters and the politics of calculation in the context of hybrid organizations.

Contributions by Miller and Rose (1990) and Rose and Miller (1992) are also instructive when investigating the ‘problematics of government’ in the aftermath of natural disasters, both in relation to programmes of intervention and the technologies elaborated by different groups of experts. Such crises are arenas where a “complex assemblage of diverse forces - legal, architectural, professional, administrative, financial, judgmental” may be mobilised (Rose and Miller, 1992, p. 183). Disasters are settings for the activation of the ‘exceptional’ government of economic life, of populations, welfare, resources and territories.

Given that knowledge is central to the “activities of government and to the very formation of its objects” (Rose and Miller, 1992, p. 175), the process of constructing knowledge about impacted territories and populations in a disaster recovery scenario may demand a range of activities. These include the comprehensive identification, calculation and classification of each impacted family and building. And here the relevance of accounting emerges as a territorializing activity “by making *physical* spaces calculable” (Mennicken and Miller, 2012, p. 20, *emphasis in original*). Calculative technologies are pivotal to the acquisition and accumulation of knowledge in the areas impacted by disasters. As Miller and Rose (1990, p. 7) reminded us, programmes of government depend on “the construction of devices for the inscription of reality in a form where it can be debated and diagnosed”. The diverse technologies of government that might be utilized after a natural disaster include the following: “techniques of notation, computation and calculation; procedures of examination and assessment; the invention of devices such as surveys and presentational forms such as tables; the standardization of systems for training and the inculcation of habits; the inauguration of professional specialisms and vocabularies; building designs and architectural forms" (Rose and Miller, 1992, p. 183).

Other commentators have also identified technologies of government that may feature in post disaster scenarios. Bowker and Star (1999, pp. 10-13, 137-139), for example, articulate the importance of classification, that is, the "spatial, temporal, or spatio-temporal segmentation of the world". They also refer to the significance of "list making", an activity fundamental to "coordinating activity distributed in time and space". Maps too are key devices for representing impacted territories and populations. They "are both a product of and intervention in a distributed series of political knowledges" (Crampton, 2007, p. 224).

In the aftermath of catastrophes a broad variety of expertise may be required for "problematizing new issues" and determining interventions (Rose and Miller, 1992, p. 188). Disasters may require the presence of a wide range of government officials and "technicians of space" such as architects and engineers to inspect and assess building damage, repair and reconstruct buildings, and implement short-term housing solutions. Experts are needed to map areas, and define the zones where new settlements are to be constructed (Foucault, 2007, pp. 12-20). Experts not only plan and design building space, they are also concerned with the wider 'politics of habitat', embracing issues such as public hygiene and creating 'green' spaces (Elden, 2016, pp. 87-90). Experts may also be involved in the allocation of evacuees to houses. This may be achieved by constructing 'social lists' (Walker, 2004; Servalli, 2013). Such devices become tools for the "spatial distribution of individuals" (Elden, 2016, p. 88). Experts are also important for designing performance management systems that facilitate the control and monitoring of on-site operations 'at a distance' by the central state (Latour, 1987; Robson, 1991, 1992). Administrative experts translate post-earthquake issues into economic planning and reporting.

3. Research method and sources

This paper forms part of a research project embracing an 11-year observation period that commenced immediately after the focal earthquake in 2009. Interviews for the current investigation began in 2016, following the publication of initial studies on the disaster (Sargiacomo *et al*, 2014; Sargiacomo, 2015). Our use of retrospective interviews with various experts permitted the gathering of information about the use of calculative technologies relating to impacted populations and territories. Our approach built on the assumption that prominent actors are best placed to communicate information about such practices and the contexts in which they were utilized (Bertaux and Kholi, 1984, p. 226).

Our connections with the Head of the Administration and Accounting Office in the Civil Defence Department (who became Head of the Civil Defence department in 2017) facilitated the identification of significant actors to interview. Among the interviewees were the President of the Reconstruction Consortium, the Director of the Special Office of Reconstruction, the Governor of the Abruzzo Region, the Mayor of L'Aquila, and consortia partners drawn from engineering and construction concerns. Information about the interviewees is provided in Appendix B. Semi-structured interviews with key actors were supplemented by follow-up communications to obtain clarifications and additional material. A total of 31 semi-structured interviews with 15 interviewees were scheduled. Interviews were conducted through the data gathering and analysis phases of the project until a point of saturation was reached by November 2019 (Bertaux and Kholi, 1984, p. 226).

Over the period of study, a considerable volume of national, regional and local government decrees, circulars and ordinances became available, as well as a variety of newspaper and media articles (see Appendix A). This material not only provided an important data source, it also facilitated the identification of potential interviewees. Printed sources also included civil defence reports and papers relating to the Forcase Consortium and the Forcase project. These documentary materials offered confirmation of the data obtained from oral testimonies.

In the next section we explore the art of government in action during the emergency stage of the natural disaster, and identify the major actors in the observation field.

4. The art of government during the emergency phase: the classification of impacted territories and populations

On 6 April 2009, when the earthquake struck L'Aquila, the Italian Government declared a "state of risk" and later announced a national state of emergency (Decrees of the President of the Council of Ministries). According to Italian Law (n.225, 24 February 1992, art.2) a 'state of emergency' can only be declared when a natural calamity, catastrophe or other event occurs that, due to its "intensity and scope, requires the application of extraordinary means and powers" (Bignami, 2010). This normally arises when an earthquake is equal to, or higher than, 6 on the Mercalli scale (Lee *et al.*, 2002), or its equivalent on the Richter scale (Richter, 1935). The seismological classification of the event effectively triggers a shift from 'normal' government to 'exceptional' government, and generates responses in defined territories and populations. In 2009 the then Head of Civil Defence was appointed as Commissioner delegated to guide post-disaster operations. The Department of Civil Defence, which connected local and provincial governments impacted by the quake, commenced a number of activities, ranging from search and rescue operations, to assembling tents, establishing reception areas for the displaced population, organizing hotel accommodation, and providing meals and healthcare assistance.

For the purposes of this study it is important to note that the Civil Defence Department developed macro-seismic intensity evaluations and conducted field surveys to assess damage (Galli *et al.*, 2009). These practices were focussed on the territorial demarcation of the disaster space and the affected buildings and populations therein. Mapping was used as a mechanism of calculation. It was elemental to representing and partitioning the territories and populations struck by the quake and to thus identifying those deemed eligible for post-earthquake assistance and reconstruction funds. The affected territory was defined on maps as the "seismic crater space" and comprised municipalities where the earthquake registered 6 degrees or higher on the Mercalli scale (Department of Civil Defence – hereafter DCD - n.3, 16 April 2009). Following this assessment, the City of L'Aquila was listed as "top priority" and 56 seriously damaged towns were identified in the Abruzzo region as "second priority" (DCD, n.11, 17 July 2009). The area included in the 'seismic crater' (see Figure 1) was 2,387 km^2. Its population was 144,757.

(Figure 1 about here)

These territories were eligible to obtain extra public monies in the aftermath of the disaster, and their citizens were entitled to financial benefits such as income tax exemption and healthcare fee exoneration.

In order to facilitate their governance, further gradations of impacted urban spaces were introduced. Buildings were classified with a view to assessing damage, safety and usability. Five categories of buildings were identified. Type A were "structurally safe buildings" to which residents were allowed to return. Buildings classified as type B-C were deemed "temporarily unsafe buildings, but safe following first intervention measures". Type D buildings were "temporarily unsafe and to be further assessed", while buildings classified as E or F constituted a "Red Zone", of "unsafe" properties. The results of the enumeration of buildings according to this classification were reported as in Table 1.

Table 1: The Classification of Buildings in the 'Seismic Crater'

Number of buildings classified by use						
Private		Public	Hospitals	Barracks	Schools	Productive
27,249		722	38	109	434	1,157
Percentage of buildings classified by use						
Classification	Private	Public	Hospitals	Barracks	Schools	Productive[2]
A	52.7%	54.4%	52.6%	68.8%	53.2%	58.2%
B	14.6%	17.7%	18.4%	24.8%	26.5%	17.6%
C	2.8%	4.6%	15.8%	2.8%	2.3%	4.3%
D	1.2%	2.1%	2.6%		3.5%	
E	24.4%	18.8%	10.5%	3.7%	12.9%	15.0%
F	4.4%	2.4%			1.6%	4.0%

Source: Undersecretary of the State, *Application for Assistance from the European Union Solidarity Fund (EUSF)* (2009, p. 41).

These classifications, in tandem with methods of territorial partitioning and codification, paved the way for the management of the transition from the emergency to the reconstruction stage of the trauma.

In the aftermath of a disaster there is invariably an urgent need to find accommodation solutions. Prior literature points to distinctive phases of 'emergency sheltering', 'temporary sheltering', 'temporary housing' and 'permanent housing' (Quarantelli, 1982, p. 2; 1998). These sheltering and housing phases do not necessarily "progress in a neat linear fashion" (Quarantelli, 1982, p. 78). In the former (sheltering) stage temporary sheltering may be found in tents, barracks, sport halls and hotels. In the latter (housing) stage temporary accommodation may take the form of rented houses, mobile homes or purpose-built prefabricated buildings. Permanent housing comprises the

[2] The column total is 99.1%. This and other arithmetical errors in tables and figures reproduced in this paper (likely arising from rounding) reflect those contained in the original documents.

reconstruction of devastated properties or the construction of new houses for impacted individuals and families.

In our focal case the state, through Civil Defence operations, established a series of "temporary housing" solutions for evacuees including renting homes and access to wooden houses. Prefabricated housing solutions[3] were also planned. These were restricted to citizens formerly resident in buildings classified as "E" and "F" or "Red Zone" (per above) in the town of L'Aquila. Indeed, the inhabitants of the latter buildings suffered most economic loss, and would wait several years before re-accessing their reconstructed homes.

The inspection, assessment and classification of damaged buildings were essential to implementing the programme of temporary housing. The first technical-financial model of housing need issued on 16 April 2009 was intended to allocate only 3,000 evacuees. As more precise estimates emerged there followed a subsequent model on 22 April 2009 for the housing of 12,000 evacuees (Forcase, 2010, p. 371). The governmental aims were embedded in a Legislative Decree n. 39, on 28 April 2009 that stipulated the "urgent realization of houses…to allow the quickest allocation of persons whose houses have been destroyed or evaluated as not accessible by the competent public bodies" (art.2). The state programme based its hypothesis on the allocation of evacuees to new houses over 10 months and allocated public funds of €400m for the construction of temporary housing (art.2, Legislative Decree no.39, 28.04.2009).

5. Act 1. A governmental programme of temporary housing: the Forcase Consortium

5.1 The Forcase Consortium as a hybrid organization

[3] Prior examples of short-term housing solutions may be found in the US and elsewhere during the 20th century (e.g. San Francisco, 1906; Wilkes-Barry Flood, 1972; Grand Island Tornado, Nebraska, 1980) (see Quarantelli, 1982).

The principal programme to provide housing following the earthquake was the CASE project.[4] Its object was to construct 184 anti-seismic and environmentally sustainable housing units on 19 sites to accommodate 15,500 residents (Alexander, 2013, p. 63). The Forcase consortium was formed on 8 May 2009 to develop the project. The consortium comprised the Eucentre Foundation, a not-for-profit organization for training and research on seismic engineering created by four public entities (University of Pavia, Superior Institute of Advanced Studies (IUSS) of Pavia, Institute of Geology and Volcanology, and the Department of Civil Defence); and two construction companies from the private sector - ICOP and Damiani. ICOP was selected given its experience in building foundation work and infrastructure (Pavia, 08.05.2009, prot.0008041, 05.05.2009). Damiani boasted considerable experience in house building.

Forcase constituted a public/for-profit hybrid, akin to state-owned enterprises (Grossi *et al.*, 2017, p. 379). It embraced a combination of different logics (Brandsen and Karre, 2011). It is widely recognised that 'hybridity' is an ambiguous term (Thomasson, 2009). The Forcase consortium can be considered a hybrid organization at policy level, as it was purposely created during the post-quake emergency and became embedded in a governmental humanitarian project to implement evacuee house building solutions. Indeed, it was specifically provided that all activities would "be executed for the Civil Defence for public interest purposes and without gaining any profit" (Letter by Calvi to Bertolaso, Pavia, 08.05.2009, p. 3). The organizational chart of the consortium refers to five main groups of activities, as portrayed in Figure 2.

(Figure 2 about here)

Two groups (prototype project and general project) were responsible for planning and coordinating the project and the development of a standard building prototype. The ICOP company managed

[4] *Complessi Antisismici Sostenibili ed Ecocompatibili*. CASE means 'house' in Italian.

logistics, materials procurement, digging activities and the positioning of anti-seismic plates in 19 worksites. Having received bids ICOP contracted 14 companies to execute works at a cost of €123,720,708. The other private company, Damiani, coordinated and controlled the construction of standard houses in worksites. Following an open bidding process it contracted out the work to 16 companies for a total of €330,000,000. The consortium also developed planning and directing activities in relation to the execution of construction work. Construction Direction (per Figure 2) was the responsibility of Professor Michele Calvi, President of Eucentre and of the consortium (Interview, Forcase and Eucentre Executive, 2019).

Through its networks of public and private companies the Forcase consortium operated in a quasi-market regime. It had the authority to institute and maintain accounting and controls relating to the project and utilised comprehensive performance measurement systems, akin to those evident in other areas (Grohs, 2014). Forcase was a hybrid organization not only in its mix of public/private 'souls' and ownership, but also in its multi-aim structure (Grossi *et al.*, 2017). It focused on policy implementation in the public interest and also on cost efficiency. As funding was derived from emergency resources provided by the state, external control was maintained by the Office of Administration and Accounting in the Department of Civil Defence.

5.2 A building prototype

The plan approved by the Department of Civil Defence published on 22 May 2009 indicates that the project focused on a building prototype constructed on anti-seismic plates. It was described thus: "The building prototype has a useful surface equal to circa 1,700m^2 (1,900m^2 with stairways and distribution), divided into 25-30 residences of different dimensions, able to host 80 persons" (CD Plan, 2009, p. 2). Underneath each plate were utilities and parking for 36 cars. The construction of 150 such buildings was planned. Further, for every anti-seismic plate of 1,000m^2, a further 2,500m^2 was allocated for green spaces, pathways and 'urbanisation' (ibid).

The plan included the design for the building prototype. Time and costs for the prototype were also detailed. It was stipulated that 150 plates would be constructed between June and September 2009, the first 30 being completed by July, and 30 more in each successive 20 days. The assembly, on the plates, of the prefabricated components of the first 30 buildings would commence in July and be completed within 80 days. Time would be allowed for furnishing and testing the buildings. By the end of September the first 900 houses would be ready for 2,400 evacuees (CD Plan, 2009, p. 28).

Costs for 150 plates were estimated as follows:

> For each plate prototype (average values of reference):
> - Plate foundation and isolation (circa 2,200 m^2 of total surface): €600,000.00;
> - Completed housing (circa 1,700m^2 of useful surface and plate flooring): €2,100,000.00;
> - Furniture (circa 30 apartments): €200,000.00;
> - Complementary [paths and green spaces] (circa 2,500m^2): €500,000.00
>
> Should we exclude complementary and urbanization works, the total costs per plate are €2,700,000.00, if we include them the grand total is €3,400,000.00 (ibid, p. 29).

As reported by a key actor:

> …the above calculations were the results of meetings about standard construction costs which Forcase held among its internal technicians from CD and ICOOP and Damiani, and with delegates of professional associations representing the diverse construction technologies (i.e., Assobeton, Andil, Federlegno) who had provided standard costs relating to different building systems. The resulting standard cost of slightly more that €1,300.00 per square metre was taken as the benchmark (Interview, Engineers Forcase/Eucentre, ICOP jsc, and Damiani llc, 2019).

5.3 Time-space management challenges and the development of an information reporting system

The initial planning of new “seismically isolated and environmentally sustainable buildings” commenced in late April 2009, three weeks after the earthquake (Interview, Head of Civil Defence, 2016). It was based on a ‘reasonable’ assessment of the demand for housing and in the absence of detailed quantification of what was needed (DCD, Progetto CASE, 2010a, p. 3). Urgent action was necessary despite this imprecision because building construction took at least four months and because replacement housing had to be provided before the next winter. The desirability of an accurate determination of demand was counterbalanced by "the utmost need to operate in the quickest time possible" (ibid).

Importantly, for the planning and control of operations:

> …an ad hoc information reporting system, labelled c.a.s.e., was urgently developed. This treated all worksites as a unique mega-project. It was used within Forcase for coordination and monitoring purposes. Reports were divulgated on a daily basis to apex of the civil defence department, in order to enable immediate corrective actions in relation to deviations to any part of the project. … A team comprised of chief-engineers and myself as acting Head of the Administration and Accounting Office of the Civil Defence met several times in order to craft a detailed information reporting system (Interview, Head of the Civil Defence, confirmed by Forcase/Eucentre Executive, 2019).

For each work area the c.a.s.e. reporting system provided information relating to the performance challenges that were faced on a daily basis. The system enabled the tracking of: a) the status of anti-seismic plates relative to the installation of pipeline operations; b) the status of building construction, with percentage completion for macro-categories of operations; c) the status of urbanisation operations (streets, electric, waste and reclamation infrastructures, and pavements); d) the status of new green areas; e) the status of furnishing buildings; f) the state of materials procurement; g); estimates of the progressive financial value; and, h) corrective actions needed to adjust the worksite coordination plan (Interview, Head of the Civil Defence and Forcase/Eucentre Executive, 2019; see also Forcase, 2010, p. 185).

An example of a), b), c), and d) content is shown in Figure 3.

(Figure 3 about here)

Figure 3 shows the daily report for the 21 plates in area 8. It charts progress towards the achievement of pre-defined operational steps of which there were six for foundation works and seven for house construction. The stage reached for each numbered plate was colour coded on a map. For example, in relation to the foundation works for 8.21 the map on the left indicates that the plates were completed by 19 October 2019. The map on the right indicates that the structures of the house had been constructed. The map on the right also indicates that most of the buildings were almost completed and assigned to evacuees (e.g., 8.7-8.8), while other houses had yet to be furnished and had not been assigned to evacuees (e.g., 8.5, 8.6). The report revealed progress towards completing buildings within the stipulated 80 days. Attention was also devoted to the progress of urbanisation works (sheet 1.3 in Figure 3), green works (1.4) as well as furniture procurement (1.5). This method of codification, classification and representation facilitated the control of each worksite.

Comprehensive time-space project control of the 19 worksites was also facilitated by the information represented on a multi-dimension daily report. Information was provided relating to: a) daily and weekly weather forecasts; b) the cartography of the area and the 19 worksites. The state of advance of anti-seismic and buildings works was represented by different coloured emoticons. These might portray different situations (i.e., anticipating the work-plan; aligned to the work-plan; delay of the work-plan); c) works concluded by the end of the day, and forecast; d) the state of advancement on specific worksites; e) recapitulation of materials procurement related to anti-seismic plates, walls and digging; f) advancement percentages, and number of evacuees potentially to be allocated to each building area; g) estimation of the economic value of production, divided by major classified operations-categories; h) risks and safety measures; i) various graphics and percentage comparisons of planned and actual works; and, j) any annotation and corrective action needed to adjust the plan for the worksite (Interview, Head of the Civil Defence and Forcase/Eucentre Executive, 2019; also Forcase, 2010, p. 186).

An example of the a), c), d) and e) content is shown in Figure 4 (sheets 2, 8, 4 and 5, respectively). The figure highlights how the Civil Defence Department and Forcase treated the 19 building worksites as a unique mega-project to be planned, managed, executed and controlled in time and space.

(Figure 4 about here)

The relationship between Figures 3 and 4 can be seen by locating the data for Bazzano (highlighted in Figure 4, sheet 4, 'Status of Works Advancement'). The daily and progressive procurement of materials is depicted in sheet 5 'Supplies for Plates'. Sheet 8 comprises a report showing percentage completion rates for the major construction operations as well as the number of evacuees who might potentially be accommodated in each building area. Estimates of the value of production for various processes and in total is provided in sheet 12.

These practices are interesting for several reasons. First, in a moment of crisis, a bespoke comprehensive reporting system was constructed to surveil operational activity and space. Ready-made technologies did not exist to measure performance in a post-disaster setting. Contrary to the usual practice in the globalized world, where international advisory agencies have a 'ready package' to solve performance management or financial control issues, in the focal case the technologies were crafted by the Civil Defence-Forcase team in order to address the specific issues arising in this relief project. Second, the combination of engineers and accountants who operated the system is evidence of de-compartmentalization and the assembling of calculative technologies from different areas of expertise (Miller, 1998; Rose and Miller, 1992). Engineering, performance management and costing expertise featured in each operational step and was evident in the outputs of the c.a.s.e. information reporting system. Thirdly, the c.a.s.e. system emerged as a pivotal tool for the chrono-spatial management of operations in the 19 worksites. It facilitated the coordination necessary to monitor diverse operations from the centralized procurement of materials to the installation of furniture in each apartment built. Fourthly, the role of classification as a technology of government is also apparent. Indeed, classification featured large in c.a.s.e. reports.

Worksites were controlled at a distance by the administrative office of the Department of Civil Defence. The head of the latter had the power to sanction payments. Local monitoring of worksites was the responsibility of a building sites director or his delegate. Assisted by a team of experts, the building sites director might approve or contest the works completed by the companies who won bids. These examinations were concluded with a memorandum that might discuss the financial penalties imposed on companies that failed to meet work deadlines or had made building mistakes (Interviews with Head and Member of Administration and Accounting Office, 2019). One such case was company 'XYZ'[5], which was subject to the following penalty:

> Due to the delay in the consignment of the anti-seismic pillar 1.9 in Sant'Antonio, a penalty has been applied which, on the basis of art. 9 of the Contract stipulated on 04/08/2009 repertoire 784, has been calculated as follows:
>
> Penalty sum: 16 days x 88 inhabitants x €200 = €281,600.

(Technical Administrative Examination Minutes, XYZ, L'Aquila).

Penalties were thus calculated according to the number of days lost to an evacuee in accessing their accommodation. Given that there were around 80 inhabitants per building the average penalty was €16,000 per building/day of delay. In the above calculation €200 represented the sum that the state would otherwise have spent per evacuee/day in providing alternative accommodation (Forcase, 2010, p. 112).

[5] The anonymity of the company is preserved in this study.

5.4 Governing calculable evacuees and calculable urban spaces

Another element of the c.a.s.e. reporting system was the allocation of calculable evacuees to calculable urban spaces. As stated earlier, a gross estimate of the number of houses needed was formulated three weeks after the earthquake. More accurate planning commenced from August 2009 when the Department of Civil Defence, in tandem with the city of L'Aquila, undertook an accommodation survey (CD, 2009). By Ordinance of the City Mayor (n. 1188, on 17 September 2009), 'social lists' were compiled by the Forcase consortium. These classified evacuee families and individuals and aligned them to customized houses (CD, 2009).

The Ordinance of the City Mayor established the following categories to be considered in the allocation of families to homes (CD, 2010b, pp. 4-5): families comprising not less than three members; one parent family with a child; Italian or European Union citizenship, as well as non-European citizenship with permission to stay; proximity to the location of a family's damaged home; permanent residency or continuous stay in damaged houses classified as "E" or "F" or in the Red Zone of L'Aquila; lack of availability of accommodation in any other house occupied by a member of the family; and, presence of individuals with a handicap, elderly persons, or workers occupied in the Abruzzo region at the time of the earthquake, students and children of pre-school age. The preceding suggests that the planning and allocation of short term housing solutions required a "sociospatial ordering of resources" (Elden, 2007, p. 566) based on classifying segments of the population impacted by the disaster. In this way population and territory were linked in the devastated zones of the City of L'Aquila.

The above groupings were augmented by further priority criteria, which also informed the allocation of people to houses (CD, 2010b, pp. 5-6). These comprised: a stated preference for accommodation under the CASE project, rather than for other temporary accommodation options; families that included a mobility-impaired person with particular accommodation needs; compliance with the ‘territoriality’ principle to be located close to pre-disaster residence; and, the size of family or cohabitation group.

The allocation of calculable evacuees to calculable urban spaces was processed by Forcase using another purpose-built technology - ‘Jewel’ software (Interview, Forcase/Eucentre Executive, 2019). The municipality of L’Aquila specifically required that family nuclei, or units, from districts classified as restricted areas were to be assigned to specific CASE areas while units from non-restricted areas were assigned to any another area of the CASE project (CD, 2010b, p. 6). The above criteria thus combined a series of spatial and population classifications to determine the allocation of accommodation. Lists of family nuclei comprising three or more persons, two persons, and households comprising one person, were generated using the software (CD, 2010b; Interview, Forcase/Eucentre Executive, 2019).

As indicated earlier, the initial estimation of evacuee requirements in April 2009 led to a plan for 150 new buildings. A further 15 were added before public works commenced, and another 20 following the accommodation survey conducted in August 2009. That is, a total of 185 new buildings were planned to accommodate more than 15,000 evacuees from houses classified as “E”, “F”, or “Red Zone” (CD, 2010a, p. 29). Construction was based on the prototype building design referred to above (Forcase, 2010, p. 75), modified according to the specific needs of the population groups. Digging operations commenced on 8 June 2009 and the last pre-fabricated apartment was assigned on 19 February 2010 (Forcase, 2010, p. 17). The €812m of public monies needed to fund this recovery project was double the estimate made a few weeks after the earthquake (DCD, Progetto CASE, 2010a).

The ‘numericization’ of evacuees and their needs, and their allocation to new towns, required further calculations, not only to forecast the capacity of apartments to meet the specific requirements of those who would inhabit them, but also for the provision of urban spaces. Each new town was to be a separate neighbourhood with its own sanitation and electricity infrastructure (Forcase, 2010). As portrayed in Figure 3, the new towns were built on the basis of geometrical contours in small, demarcated territories with clear internal divisions, resonant of the principles identified by Foucault when discussing the creation or reconstruction of towns (2007, pp. 14-17).

The construction of new towns involved 22km of streets, 50km of drainage conduits, 46 transformer rooms, 7 stations for telecommunications, and 2,000 pillars for street lighting (DCD, 2010a, pp. 29-30). Particular attention was devoted to environmental considerations. 60% of the new buildings were to be classified as A or A+ for energy efficiency, 7,000m^2 of solar panels were installed, as well as 35,000m^2 of photovoltaic systems. 62 hectares of public green spaces were allocated, 11,000 trees and 260,000 bushes were planted, and 30 entertainment areas were established (ibid, p. 30).

Thus in the construction of new towns, a variety of technologies of exceptional government were deployed to identify and enumerate the impacted population and determine its housing needs. These included surveys, calculations, assessments, as well as “building designs and architectural forms” (Rose and Miller, 1992, p. 183). In the next section we explore the use of such technologies by organisations with hybrid characteristics in the reconstruction phase of post-disaster management.

6. Act 2. Reconstruction consortia and a programme of permanent housing solutions

6.1 The emergence of reconstruction consortia

Following the emergency stage of the disaster an Ordinance of the President of the Council of Ministries in Italy (n. 3833, 24 December 2009) stipulated that, from February 2010, the Governor of the Abruzzo Region would be replaced by the chief of the Civil Defence department. The Governor thereby assumed the powers and responsibilities of the Commissioner Delegated to Reconstruction. The Governor later reflected:

> …the recovery phase proved to be very difficult to plan and manage, not only in terms of public monies needed, but also in terms of a plethora of laws and decrees relating to the different needs of the afflicted population… Accordingly, the cessation of the emergency stage was postponed many times by the national government until 31 August 2012 (Law 7 August 2012, n.134) (Interview, Former Governor of the Abruzzo Region, 2016).

In March 2010 the Commissioner Delegated to Reconstruction issued a decree that clarified the procedures to be deployed during reconstruction (Decree of the Commissioner Delegated to Reconstruction 9 March 2010, n.3). His priorities, constrained by the limited public monies available, became the subject of public debate (http://www.comune.laquila.gov.it/pagina199_il-piano-di-ricostruzione.html). Article 2 of the decree stipulated that arranging reconstruction plans in the historical centre of L'Aquila and in other centres was of outmost importance as was the demarcation of relevant areas and their populations. Accordingly, priority areas for intervention, numbered 1-5, were identified on a map of L'Aquila (http://www.commissarioperlaricostruzione.it/Informare/Normative-e-Documenti/Decreti-del-Commissario-Delegato-per-la-Ricostruzione-Gianni-Chiodi/Decreto-n.3-del-9.3.2010).

In a subsequent decree issued on 3 June 2010 the Commissioner Delegated to Reconstruction stipulated the rules for the constitution of reconstruction consortia (n. 12, art.3). Documentary sources reveal that reconstruction consortia were to be formed as not-for-profit entities, governed by private law codes but acting on behalf and in the mutual interest of an association of real estate owners. Their constitution enabled them to make applications for public monies for reconstruction, select and appoint groups of engineers, assign works to a building company, and coordinate, control and report on the building works to the Special Office for the Reconstruction of L'Aquila. Instalments of public monies would be received on the completion of various stages of construction.

These reconstruction consortia exhibited hybridity characteristics similar to third sector community-based welfare associations in that they originated from the intersection of the state and communities (Grohs, 2014, p. 1229). In our case, the state funded the not-for-profit consortia to implement reconstruction plans to meet the needs of their communities. All consortium members were real estate owners from defined areas of the city. The latter operated as key actors who translated governmental reconstruction plans into practice. As Parlak and Gunduz (2015, p. 1159) indicated, "hybrid structures…rely on the coordination and cooperation between public administration, private sector organizations, non-governmental organizations, as well as individual and group initiatives". Reconstruction consortia were an example of 'group initiatives'. The deeds of the first consortia constituted after the L'Aquila earthquake were published on 7 March 2011, the last were published on 9 September 2019 (http://www.comune.laquila.it/pagina101_i-consorzi-per-la-ricostruzione.html). A total of 1,757 reconstruction consortia were established. In this study we focus on the experience of the FRIROC consortium.

In L'Aquila a draft reconstruction plan was initially approved on 9 February 2012 by the local authority. An opportunity was given to citizens to provide feedback by 16 March 2012 (http://www.comune.laquila.gov.it/index.php?id_oggetto=18&id_doc=223&id_sez_ori=0&template_ori=2). By the end of that month the final plan was approved. According to the local mayor, the "most important step for boosting reconstruction was the opening of a Special Office for the Reconstruction of L'Aquila" (Interview, former City Mayor, 2016). This office (hereafter referred to as USRA), together with a separate office dedicated to the reconstruction of other towns within the 'crater space' was established under art. 67 of Law 7 August 2012. These offices received public monies from the state and organized its distribution to the territories and populations impacted by the disaster (Interview, former USRA Director, 2016). The USRA allocated funding on receipt of requests, and examined and controlled expenses.

Given the number of homes classified as "E" and "F" (as explained earlier) relative to the total number of damaged buildings (see Table 1), the key challenge posed in the Reconstruction Plan for L'Aquila was the reconstruction of private buildings (Reconstruction Plan, City of L'Aquila, Excerpt from Strategic Plans, 2011, p. 4). This was to be mainly performed by the reconstruction consortia established to manage reconstruction work on behalf of the interests and welfare of real estate owners.

In the following sub sections we explore the calculative techniques used by the consortia in their pursuit of post-disaster reconstruction.

6.2 The cartographical classification of space and population

A Decree of the President of the Council of Ministries dated 4 February 2013, n.4, identified various typologies and modes of intervention for the reconstruction of the historical centre of L'Aquila (Art.3). The decree stipulated reconstruction of different areas, real estate "aggregato", and identified the individual inhabitants eligible for funds. The term "aggregato" referred to "a set of non-homogeneous buildings, which are either connected or in contact" (www.usra.it/glossario/). Prior civil defence guidelines had classified real estate "aggregates" by reference to: the aggregate code number; real estate denomination; type of building, geographical coordinates; cadastral data; and, the owners of the building and its intended use (Guidelines for Reconstruction, Department of Civil Defence, May 2010, pp. 8-9). Through such information the residential spaces and their inhabitants were made visible and governable. Cartographical representation was prominent in this exercise.

Figure 5, for example, contains extracts from the L'Aquila Reconstruction Map as at January 2013. Here, real estate aggregate code numbers are portrayed. Different colours are used to indicate the status of real estate aggregates. For example, the reconstruction of aggregates indicated in green (eg 647, 182 and 78), have been approved. Those in light green (eg 145, 1065, 1069) represent examples where portions of aggregates have been proposed but not yet approved. Should we open the government's geographical information system website (http://webgis.comuneaq.usra.it/mappa_def.php) and insert the aggregate code 1301 in Figure 5, it would be discovered that the aggregate is situated in "Piazza Chiarino 9" in downtown L'Aquila. Information about the building would also be disclosed. In early 2013, when Figure 5 was published, the aggregate was identified as proposed in November 2012 and recognised by the local government (as indicated by light grey shading). The geographical information system reveals that the contractor appointed to build the property has since received a final instalment of reconstruction funds of €3,093,636.88 for apartments classified as "E". Figure 5 indicates how the Reconstruction Map of L'Aquila was used to identify reconstruction priorities. The cartography illustrates how space and society were partitioned and classified. The annotated city map appears as both a product and a tool of governmental intervention (Crampton, 2007, p. 224).

(Figure 5 about here)

6.3 The interplay of administrative, architectural, and engineering practices in reconstruction consortia

Documentation submitted by reconstruction consortia, as examined, modified and approved by the USRA, allow us to decipher how knowledge was amassed through the interplay of architectural and engineering classifications and economic calculi. The following table, which draws on documentation provided by the FRIROC consortium, illustrates these inter-connections. The consortium’s application commenced in June 2013 (USRA, Prot. 40662) and was initially approved in March 2015 (USRA prot. 21638). Following requests for further information and assessments, funds were agreed on 11 May 2016.

Table 2: USRA Sheet on Restoration Works Requested by the FRIROC Reconstruction Consortium, April 2016

Structural Unit		Damage Level	Vulnerability Level	Reimbursement Level	Percentage Requested/ Eligible	Total Acknowledged Surfaces (m^2)	Maximum eligible amount of works (€)
SU 1	requested	D3	V3	L2 (€1,100)	182.00%	228.01	456,476.02
	eligible	D3	V3	L2 (€1,100)	177.00%	228.01	**443,935.47**
SU 2	requested	D2	V3	L2 (€1,100)	140.50%	194.29	300,275.20
	eligible	D2	V2	L1 (€1,000)	140.50%	194.29	**272,977.45**
SU 3	requested	D3	V2	L2 (€1,100)	139.75%	296.87	456,363.41
	eligible	D3	V2	L2 (€1,100)	139.00%	296.87	**453,914.23**
SU 4	requested	D3	V2	L2 (€1,100)	145.00%	154.47	246,379.65
	eligible	D2	V2	L1 (€1,000)	145.00%	154.47	**223,981.50**
SU 5	requested	D1	V1	L1 (€1,000)	100.00%	18.54	18,540.00
	eligible	D1	V1	L1 (€1,000)	100.00%	18.54	**18,540.00**
SU 6	requested	D3	V2	L2 (€1,100)	143.50%	308.67	487,235.60
	eligible	D3	V3	L2 (€1,100)	143.50%	308.67	**487,235.60**
SU 7	requested	D3	V2	L2 (€1,100)	136.75%	111.05	167,046.96
	eligible	D3	V2	L2 (€1,100)	136.75%	111.05	**167,046.96**
	TotTa l Total					8,162.34	**2,067,631.20**

Source: Project part second, 22 April 2016, provided by the Consortium President, USRA prot. 6009, 22 April 2016.

The second column in Table 2 refers to “damage level”. The procedure for determining this data was explained by the President of the relevant reconstruction consortium:

> The damage level was initially assessed by third party civil protection observers on the basis of a European macro-seismic scale (Ems98). This ranged from D0, or nil damage, to D5 - extremely serious damage. In the case of L’Aquila, there was level [D]1, that is, light damage, and levels 2-3 damage or medium to serious damage. (Interview, President of the Reconstruction Consortium, 2016).

In order to facilitate the use of a common architectural language by consortium partners, a comprehensive instructions manual was produced (USRA, Seism Abruzzo 2009, Instructions Manual for the sheet P.E.R. L’Aquila, January 2013). This contained descriptions of the damage classification (ibid, p. 32) and images demonstrating damage levels (ibid, pp. 20-21). These are illustrated in Figure 6.

(Figure 6 about here)

Consistent with Rose and Miller's (1992, p. 183) suggestion that technologies of government may be actualised through standardised systems and vocabularies, the USRA also made available a 'Book of Sayings and Glossary' (USRA, 25.02.2013). According to a consortium president and a real estate owner the latter encouraged the dissemination and use of a common disaster vocabulary for the representation of architectural damage. This vocabulary featured in reconstruction requests (Interview, President Reconstruction Consortium, 2016; Interview, real estate owner, 2016).

Once damage levels had been determined and vulnerability status established as low, medium or high (i.e., V1, V2 and V3 in Table 2), a consortium president could formulate a request for reconstruction funds from the state, as calculated in Table 2. Standard reconstruction costs were used in parallel with architectural classifications. This enabled the performance of calculations according to the following levels of reimbursement: L0: €700 per m^2; L1: €1,000 per m^2; L2: €1,100 per m^2; L3: €1,270 per m^2; demolition reimbursement: €100 per m^2 (Interview, Chief Engineer of FRIROC Consortium, 2016). These standard costs were suggested by a committee of scientific experts who adapted the classification from that used following the Umbria-Marche earthquake of 1997 (Interview, 2016 with a member of the L'Aquila Scientific Committee 2009, and past Co-Chair of the Umbria-Marche 1997 Earthquake Reconstruction Scientific Committee). The episode shows how the public funding of reconstruction schemes was aligned to architectural classification, again demonstrating the assembling of calculative technologies from diverse fields (Miller, 1998; Rose and Miller, 1992).

The reimbursement procedure also intertwined calculative practices and architectural surveys. The fifth column in Table 2 concerned percentage of funds requested. The amounts were dependent on the classification of property either as prestigious real estate in the City of L'Aquila (where the percentage could rise to 160%), or real estate safeguarded by laws relating to environmental-historical protection (where the percentage could increase up to 200%). Percentage funds requested was multiplied by 'total acknowledged surfaces' subject to reconstruction (column six) to determine total funds requested.

As shown in Table 2, there were two rows for each real estate unit. In the first row the amount "requested" by the consortium was stated, and in the second was the amount "eligible". The Director of the USRA recalled, "for any request received, we established a control procedure which worked in parallel with the architectural/technical and administrative/economic evaluations" (Interview, former USRA Director, 2016). Internal checks by the USRA triggered changes to the "damage level" (e.g. Structural Unit (SU) 4 in Table 2), the "vulnerability level" (e.g. Structural Unit (SU) 2), the standard "reimbursement level" (e.g. Structural Unit (SU) 4), and the "percentage requested" (e.g. Structural Unit (SU) 1), thus generating total "eligible" amounts that differed from those "requested" by the reconstruction consortium. Having been subjected to the evaluation reported in Table 2, which established the maximum amount for eligible reconstruction works, more refined calculations of amounts requested by consortia were calculated, as per Table 3.

Table 3: USRA Calculation of Amounts Requested and Eligible for Reconstruction by the FRIROC Consortium, June 2016

	Amount requested			**Amount eligible**		
Item	Amount (€)	VAT (€)	Total (€)	Amount (€)	VAT (€)	Total (€)
A. Works						

A1. 1	Amount for reparation works, seismic improvement, and finishing and machinery connected to structural interventions	2,067,498.58	206,749.86	2,274,248.44	2,067,498.59	206,749.86	2,274,248.45
A1. 2	Amount for finishing reparation works and machinery not connected to structural interventions	0.00	0.00	0.00	0.00	0.00	0.00
A.2	Amount for restoration works on historical-artistic goods (the sum is subjected to adequacy evaluation by the Superintendent)	8,428.00	842.80	9,270.80	0.00	0.00	0.00
A.3	Amount for demolition works of existing buildings	0.00	0.00	0.00	0.00	0.00	0.00
A.4	Amount for reparation works on ancillary elements to ensure conformity of living standards	0.00	0.00	0.00	0.00	0.00	0.00
A.5	Amount for works needed to guarantee accessibility to the entrance level of external spaces and common areas	0.00	0.00	0.00	0.00	0.00	0.00
A.6	Amount for installations of mechanisms to access higher levels	0.00	0.00	0.00	0.00	0.00	0.00
A.7	Amount for works relating to cavities in high buildings	0.00	0.00	0.00	0.00	0.00	0.00
A.8	Other amounts (asbestos removal)	19,680.00	1,968.00	21,648.00	19,680.00	1,968.00	21,648.00
A.9	Total (A1.1+A1.2+A2+A3+ A4+A5+A6+A7+A8)	2,095,606.58	209,560.66	2,305,167.24	2,087,178.59	208,717.86	2,295,896.45
B. Other (Available) Sums							
B1	Tests and surveys	16,393.44	3,606.56	20,000.00	16,393.44	3,606.56	20,000.00
B2	Technical expenses	269,879.51	59,373.49	329,253.00	267,580.78	58,867.77	326,448.55
B3	Administrator payment	39,215.00	8,627.30	47,842.30	32,106.67	7,063.47	39,170.14

B4	Total (B1+B2+B3)	325,487.96	71,607.35	397,095.30	316,080.89	69,537.80	385,618.69
C. Total (A9+B4)		2,421,094.53	281,168.01	2,702,262.54	2,403,259.48	2,403,259.48	2,681,515.14

Source: USRA Final Provision on the Reconstruction Consortium denominated "FRIROC". USRA prot. 9333, 29 June 2016.

Administrative controls guided the USRA as to when not to permit further restoration works, as in category A.2. Here, "the amount recognized following authorizations by the competent Superintendence, should be separately funded by a specific contribution" (USRA, 11/05/2016, prot. 06783, p. 3/5). A separate amount was also allocated for "asbestos removal" (i.e., row A.8). Much discussion concerned the sums requested in section B of Table 3 (Other (Available) Sums).

By calculating the individual and total amounts requested and eligible per real estate unit, governmental practices represented the urban spaces to be rebuilt. Through classifying, comparing and hierarchizing requests, classes and categories were assigned to the people who inhabited spaces, thereby rendering them visible. The foregoing procedures were key to the acquisition and accumulation of governmental knowledge in the various city territories. The architectural content of the reconstruction plan, and the partitioning of its structural units inhabited by different citizens, was mirrored in the economic and technical budget and recapitulation sheets (Tables 2 and 3). The requests for funds by reconstruction consortia were validated following the comprehensive examination of USRA inspectors, from both an architectural/technical and from an economic/administrative perspective. Note the double-signature at the bottom of Table 3, representing the names of experts from different knowledge fields appointed to scrutinise the requests: i.e., an engineer for structural verification, and an architect for the economic/administrative examination.

7. Concluding discussion

The aim of this paper has been to explore the calculative techniques that emerge at the intersection of disaster government and hybrid organizations. To date the literature on hybrid organizations has investigated a variety of scenarios (e.g., Kurunmäki and Miller, 2006; Miller *et al.*, 2008; Grossi and Thomasson, 2015; Grossi *et al.*, 2017; Johanson and Vakkuri, 2017; Gebreiter and Hidayah, 2019). However, it has left unexplored the role such organizations play in post-disaster humanitarian operations, both in the short and long term processes of recovery and reconstruction. These are potentially important arenas for examining the "space between public and private forms of action" (Vakkuri and Johanson, 2018, p. 162). The study has attempted to fill this gap by "interacting more closely with practitioners in different roles…during a longer period of time" (Grossi *et al.*, 2020, p. 271) and by exploring their experiences in practice. Further, in contrast to research on hybridity informed by institutional logics, variants of institutional theory and property rights theory, this research has focused on the art of government as applied to a target population in a situation where "a deserted territory was repopulated after a great disaster" (Foucault, 2007, p. 67) - a disaster that resulted in more than 65,000 evacuees.

In the immediate aftermath of the earthquake in the Abruzzo region in April 2009, 35,000 found shelter in tents; others found refuge in hotels and private houses. 15,000 evacuees from the Red Zone of the City of L'Aquila were allocated to 185 new buildings in temporary new towns. At the time of writing only 5,000 remained in this accommodation, the remainder had returned to their restored homes. According to the USRA Director, by 2019 75% of the public monies allocated to reconstruction had been spent. The feared mass migration from L'Aquila and the consequent desertification of the city had not materialised (Interview, USRA Director, 2019). Data from the National Institute of Statistics suggest the effectiveness of the state's approach. They indicate that the number of citizens resident in L'Aquila remained stable in the years 2009-2019.

In ‘Act 1’ of our history of the dislocation caused by a major trauma to a territory and its population, it has been shown that the state deployed diverse calculative techniques drawn from various disciplines. The “problematics of government” (Rose and Miller, 1992) arising from the disaster were investigated and solutions were devised using these technologies. In the emergency phase of the disaster the boundaries of society and space were demarcated. Technologies of government, elaborated by diverse experts were pivotal to the acquisition and accumulation of knowledge about disaster impacts, the construction of recovery programmes, and informing debates and diagnoses (Miller and Rose, 1990, pp. 6-7). The list of technologies called into action in the focal case was extensive. In addition to accounting it included “building designs and architectural forms” (Rose and Miller, 1992, p. 183). It included cartographic representations that generated “discourses on territorial partitioning, boundary making and the politics of spatial knowledge” (Crampton, 2007, pp. 223-224). ‘Social lists’ (Walker, 2004; Servalli, 2013) of the impacted population assisted the “sociospatial ordering of resources” (Elden, 2007, p. 566) by matching calculable evacuees to calculable short-term housing solutions. Governing is indeed, “a science of endless lists and classification” (Gordon, 1991, p. 10; Bowker and Star, 1999, p. 16).

The analysis of the Forcase Consortium has shown how performance was measured on a daily basis, and involved comparisons over time and space. Financial and non-financial measures were taken for various purposes, ranging from internal planning, coordination, decision-making and deviance analysis, as well as for external accountability. The c.a.s.e. information reporting system embraced an ‘avalanche’ of non-financial performance indicators (Kurunmäki and Miller, 2006, p. 97). These were not only pivotal to daily time-space planning and control, but also allowed the Civil Defence department to govern and monitor at a distance the decentralized housing activities of the CASE project.

The different logics sustaining private-public ‘souls’ (Brandsen and Kerrè, 2011; Skelcher and Smith, 2015), and the intertwining of technologies drawn from engineering, architecture and accounting, triggered innovation in performance management and the development of an information reporting system that translated a governmental programme into practice. As ready-made technologies did not exist before the disaster, diverse experts were engaged to assemble a made-to-measure information system. Experts also intervened to craft software for evacuee-housing allocation. This was redolent of the functioning of accounting as a form ‘bricolage’ where calculative technologies from different disciplines are combined to address a particular problem (Miller, 1998). The engagement of various experts itself represented a form of de-territorialization of subject disciplines (Mennicken and Miller, 2012, p. 24). These attempts by a hybrid organisation and the Civil Defence department to formulate housing solutions in the immediate aftermath of the earthquake laid the foundations for the development of longer-term solutions in the reconstruction phase.

In ‘Act 2’ of our research we discussed the macro-level governmental programme to implement long-term housing solutions. We analysed the micro-level operations of FRIROC, a reconstruction consortium, from the time of its constitution to the completion of rebuilding work in a particular area. In the reconstruction phase experts elaborated public programmes designed to restore the economic life and welfare of impacted populations and territories. Other technologies were mobilised to facilitate implementation. Various scientific classifications were devised to determine the ‘damage level’ and ‘vulnerability level’ of buildings and these were attached to a scale of standard reconstruction costs and reimbursements. These classifications and calculations were used to determine the funding required for rebuilding works on each structural unit. The in/outflow of administrative and non-administrative information between the reconstruction consortia and the

USRA office generated new identities for individuals and families through the labels of 'real estate aggregates'. Technologies of government relating to reconstruction also included the standardization of systems and vocabularies (Rose and Miller, 1992, p. 183). This was manifested in the production of instruction manuals and glossaries that introduced common procedures and languages among experts drawn from accounting, engineering and architecture.

As stated earlier, this research represents the first longitudinal study in accounting and accountability that charts post-disaster operations from the emergency to the reconstruction phase. It embraces an 11-year observation period. More longitudinal and cross-comparative studies are needed to unveil the deployment of calculative practices where diverse hybrid organizations are called into action in the aftermath of disasters. There have been numerous other seismic events in Italy (such as in Macerata, Marche region, 2016-2017 (see Ricciardelli, Manfredi and Antonicelli (2018), and Siena, Tuscany, 1798 (see Carungu and Paolicelli (2018)), and elsewhere, in historical and contemporary settings, that merit investigation. Furthermore, there remains much to learn about the role played by hybrid organizations in the operation of mega-projects, intended either to prevent disasters (e.g., flooding in Rotterdam and Bad Ems, Germany), or to repair communities in post-disaster scenarios.

Geophysical disasters such earthquakes represent one of numerous events that cause large-scale human suffering and have profound economic, social and political consequences. Amid concerns about the emergence of 'catastrophic societies', it is hoped that the accounting research community will turn its attention to other crises, whether they be related to climate change, environmental degradation, inequality, military aggression or biological shock, where calculation likely features large in their management (Elliott and Turner, 2012, pp. 165-168; Diamond, 2005; Tainter, 1988; Walker, 2016). Indeed, the recent coronavirus pandemic has been identified as a potential episode of economic and social collapse. As Foucault (2007, pp. 57-67) observed, and as contemporary experience amply demonstrates, in the past and in the present epidemics are important sites for the utilisation of calculative technologies to facilitate the security of threatened populations and territories.

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Appendix A. Sources

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Letter by the President of Eucentre Foundation Prof. Calvi to the CD Head dr. Guido Bertolaso (8 May 2009).

Organizational Chart of the Forcase Consortium on May 8, 2009.

Excerpt of C.A.S.E. daily report n.134 of October 19th, 2019 related to the working site of Bazzano.

Excerpt of C.A.S.E. daily report n.134 of October 19th , 2019 related to the 19 working sites.

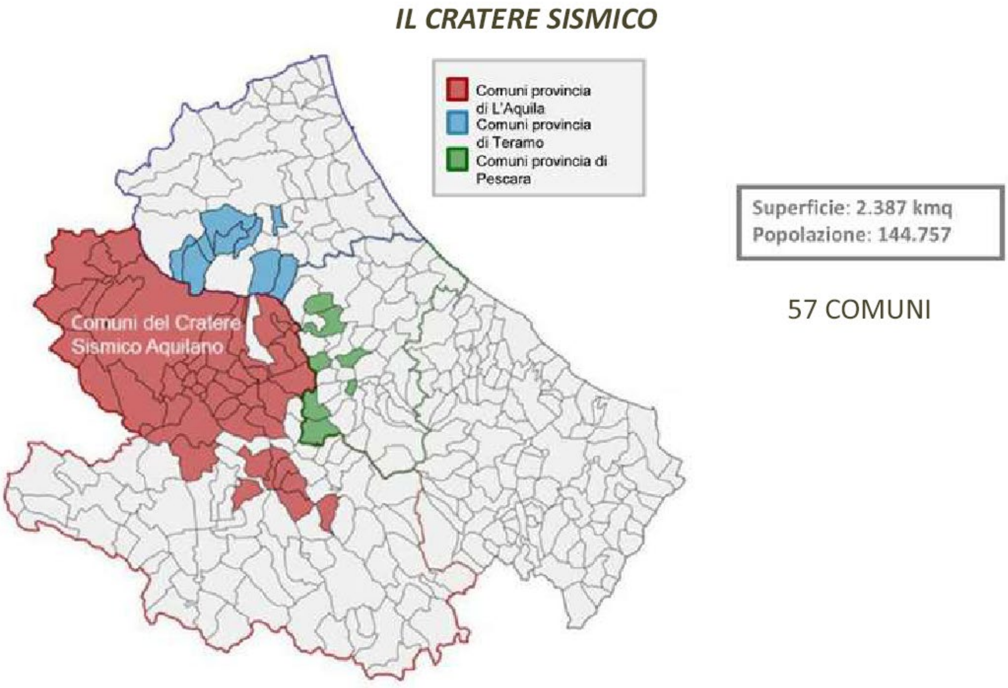
Technical Administrative Examination Minutes, Company XYZ, L'Aquila.

Appendix B. Interviews

Interviewee	Role played before/after the disaster	City, Year of interview(s)
Head of Civil Defence	Head of the Administration and Accounting Office of the CD at the time of disaster, Vice-Chief from 2011 to 2017, Chief from 2017 onwards.	L'Aquila, Rome 2016-2019
Head of the CD's Administration and Accounting Office	Head of the Administration and Accounting Office of the CD and former member of this office at the time of 2009 disaster.	Rome 2019
Member of the CD's Administration and Accounting Office	Member of the Administration and Accounting Office of the CD, and former member of this office at the time of 2009 disaster.	Rome 2019
Forcase Consortium and Eucentre Executive – Organization Coordinator	In 2009-2010 held a key position in CASE Project, supporting civil defence work, including day-to-day coordination and control of evacuee housing management.	Rome 2019
Forcase Consortium Engineer	Delegate of the Forcase Consortium. Responsible for several tasks relating to buildings.	By phone 2019
Engineer, at Damiani Construction Company llc.	Engineer from one of the two private companies who were partners in the Forcase Consortium. Member of the Directional Board of Forcase Consortium with responsibility for building and construction.	By phone 2019
Engineer, at ICOP construction company jsc.	Engineer of one of the two private companies who were partners in the Forcase Consortium. This company had site responsibility for plates and infrastructure.	By phone 2019
Former Mayor of the City of L'Aquila	City Mayor before, during and after the disaster, until June 2017.	L'Aquila 2016
Former Governor of the Abruzzo Region	Governor of the Abruzzo Region before, during and after the disaster. Replaced the Chief of Civil Defence from 1 February 2010.	Pescara 2016
USRA Director	Director of the Special Office for the Reconstruction of L'Aquila.	L'Aquila 2019
Former USRA Director	Former Director of the Special Office for the Reconstruction of L'Aquila.	Rome 2016
Member of the L'Aquila Earthquake Reconstruction Scientific Committee	Member of a special group of USRA advisors comprising experts appointed by the Italian government. Also involved in the classification of standard reconstruction costs.	Rome 2016
President of the Consortium-FRIROC	The gatekeeper of architectural-engineering-accounting and non-accounting information gathered on behalf of the FRIROC Consortium.	L'Aquila 2016-2019
Chief-Engineer of the Consortium-FRIROC	Involved in diverse projects to reconstruct damaged buildings in L'Aquila, including those pertaining to the Reconstruction Consortium 'FRIROC'.	L'Aquila 2016

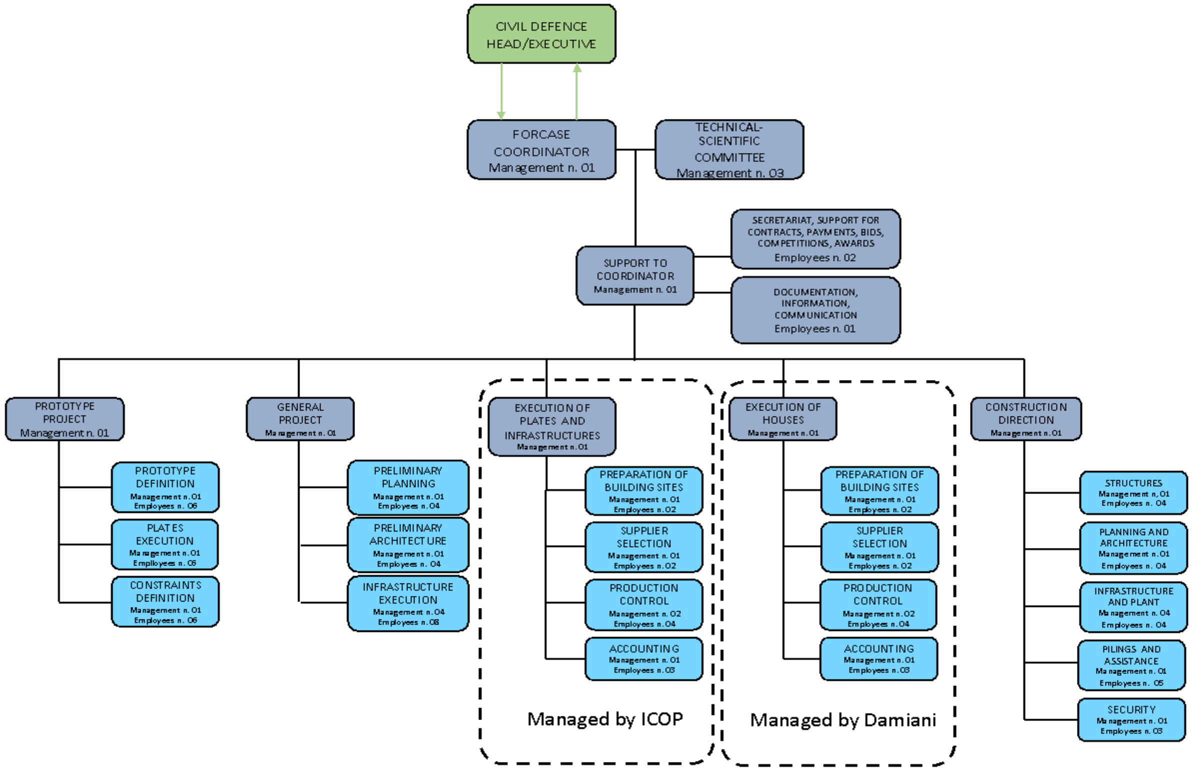
Owner of a real estate unit	An owner of the houses subject to reconstruction by the FRIROC Consortium.	L'Aquila 2016

Figure 1: Territories and Populations Struck by the L'Aquila Earthquake as Defined by 'The Seismic Crater'



Source: USRA Special Office for the Reconstruction of L'Aquila, 2019.

Figure 2: Organizational Chart of the Forcase Consortium



Source: Reproduced from attachment 2 of Letter 8 May 2009, Prof Calvi to Dr Bertolaso.

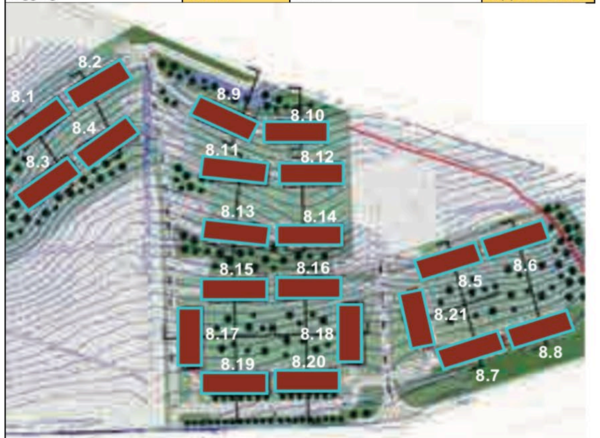
Figure 3: Extract from a C.A.S.E. daily report (No. 134 relating to the worksite at Bazzano, 19th October 2019)

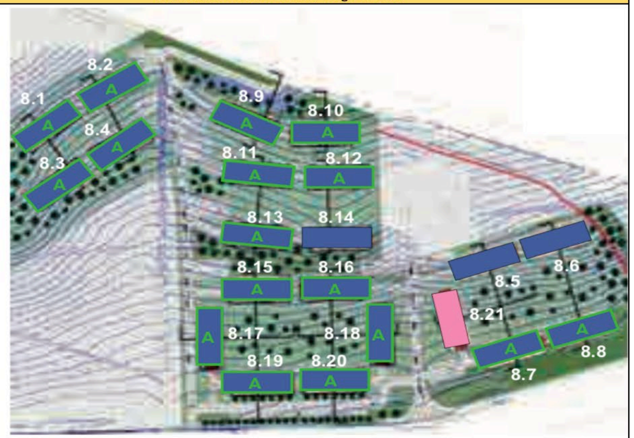
0. GENERAL REPORT						
C.A.S.E. PROJECT						
Daily Report	134	of 10/19/2009	No. Plates	21	Lot	7
Area Report	8	BAZZANO			Progressive working day N°	134

1. STATUS OF WORKS ADVANCEMENT

1.3 URBANIZATION			
Eng.Armido Frezza llc			
consign:	08/05/09	works to be completed by:	10/04/09
INFRASTRUCTURE			95%
STREETS			85%
INDUSTRIAL FLOORING			90%
Completed			**91%**
1.1 PLATES			
Digging	PRS ATI	Flows	Zoppoli Pulcher

1.4 GREEN WORKS					
Consorzio Sestante					
consign:	09/17/2009	*end by:*	10/21/2009	Completed	**50%**
1.5 FURNITURE					
Del Tongo-Florida					
Number of furnished houses:		17		Completed	**81%**
Houses with ongoing furnishing:		8.5, 8.6, 8.14			
1.2 HOUSES					
Maltauro-Consta-Eschilo-Coge-Frezza					





Foundation Works

- Work not started
- Digging completed
- Foundations completed
- Pillars completed
- Slabs finished = plates completed
- Walls finished

House Construction

- Works started
- Structures and plugs completed
- Machineries completed
- Doors and windows finished
- Finishing completed = house completed
- Furnished house
- A House allocated to inhabitants

Source: Forcase/Eucentre.

Figure 4: Extract from a C.A.S.E. daily report (No. 134, relating to 19 worksites, 19th October 2019)

0. GENERAL REPORT			
PROJECT C.A.S.E.			
Daily report N.	134	of	10/19/2009

2. Weather						
Mo	Tu	We	Thu	Fri	Sa	Su
10/19/2009	10/20/2009	10/21/2009	10/22/2009	10/23/2009	10/24/2009	10/25/2009
11/3° C						

4. STATUS OF WORKS ADVANCEMENT / AREA: DETAILS

Area	Lot	Plates	Name of Working Site	PLATES	Digging	Foundations	Pillars	Slabs	Walls	HOUSES	Structures	Machineries	Doors and Windows	Finishing	Urbanizations	Green works	Furnitures
1	1	11	SANT'ANTONIO	100%	100%	100%	100%	100%	100%	72%	92%	71%	39%	55%	50%	0%	0%
2	5	3	COLLEBRINCIONI	100%	100%	100%	100%	100%	100%	47%	87%	30%	0%	13%	35%	0%	0%
3	1	20	CASE DI PRETURO	100%	100%	100%	100%	100%	100%	99%	100%	99%	99%	97%	91%	55%	80%
4	1	11	PAGLIARE DI SASSA	100%	100%	100%	100%	100%	100%	73%	91%	62%	64%	54%	43%	0%	0%
5 - 11	2	4	PAGANICA SUD	100%	100%	100%	100%	100%	100%	98%	98%	98%	98%	98%	44%	0%	0%
7	7	9	TEMPERA	89%	92%	89%	89%	89%	89%	38%	60%	37%	10%	16%	39%	0%	0%
8	**7**	**21**	**BAZZANO**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**99%**	**99%**	**99%**	**98%**	**99%**	**91%**	**50%**	**81%**
9	7	7	SANT'ELIA 1	100%	100%	100%	100%	100%	100%	96%	99%	99%	93%	91%	38%	30%	86%
10	7	4	SANT'ELIA 2	100%	100%	100%	100%	100%	100%	34%	75%	0%	0%	0%	39%	0%	0%
14	1	18	SASSA ZONA NSI	97%	100%	100%	100%	89%	100%	79%	82%	77%	79%	74%	46%	0%	22%
16	2	5	CAMARDA	100%	100%	100%	100%	100%	100%	85%	90%	80%	80%	80%	29%	0%	0%
20	6	4	ARISCHIA	100%	100%	100%	100%	100%	100%	20%	40%	10%	0%	0%	74%	0%	0%
21	0	6	ROIO POGGIO	100%	100%	100%	100%	100%	100%	26%	45%	13%	0%	15%	14%	0%	0%
22	0	6	ROIO 2	100%	100%	100%	100%	100%	100%	55%	75%	50%	3%	53%	19%	0%	0%
23	0	4	ASSERGI 2	100%	100%	100%	100%	100%	100%	32%	70%	5%	0%	0%	4%	0%	0%
24	0	25	PAGANICA 2	88%	100%	98%	84%	84%	100%	22%	44%	13%	0%	0%	2%	0%	0%
25	0	4	GIGNANO	100%	100%	100%	100%	100%	100%	40%	75%	30%	10%	0%	12%	0%	0%
26	0	5	COPPITO 2	100%	100%	100%	100%	100%	100%	8%	18%	0%	0%	0%	0%	0%	0%
27	0	18	COPPITO 3	98%	100%	100%	100%	94%	92%	44%	54%	39%	35%	36%	36%	0%	0%
		Plates:	185	97%	100%	99%	97%	96%	98%	62%	75%	56%	48%	50%	43%	13%	23%

5. SUPPLIES FOR PLATES

Supplies	Supplier	Units	Daily number	Progressive number
Magrone	COLABETON	cubic metres		31.636
	SMI	cubic metres		4.174
Concrete	COLABETON	cubic metres		201.135
	SMI	cubic metres	600	17,683.5
Inserts	CORDIOLI	apiece		2.952
	EDIMO	apiece		3.176
Pillars	CORDIOLI	apiece		2.952
	EDIMO	apiece		3.176
	Impresa (Cls)	apiece		1.120
Provisional supports	FIP	apiece		560
	ALGA	apiece		680
Definitive supports	FIP	apiece		2.232
	ALGA	apiece		3.016
	ALGA per Cls	apiece		960
Net	Veneta Reti	Kilo	30,000	31,794,728

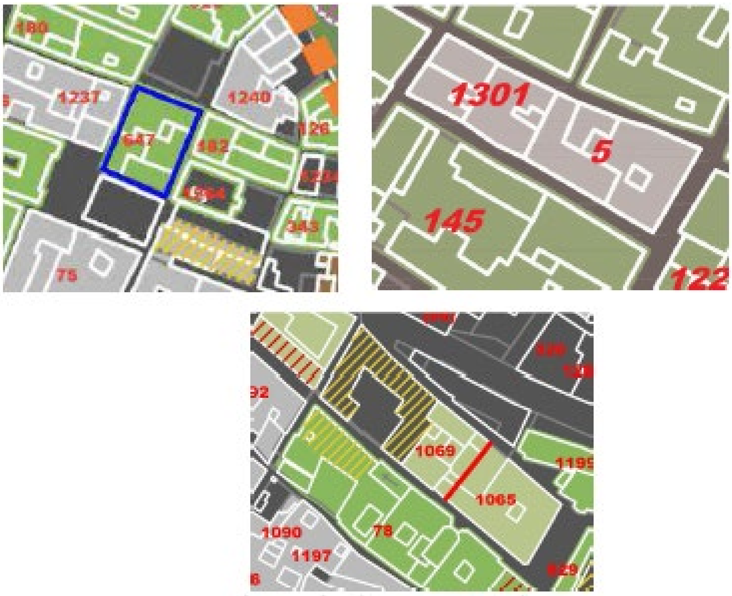
12. ESTIMATION OF PRODUCTION VALUE		
Implementation Phase	Processing	EURO
Plates	Digging	7,433,774
	Construction	36,572,397
	Net Armor	15,085,138
	Plates	38,497,567
	Isolators	8,859,975
	Concrete	21,861,627
Total for Plates		128,310,478.00
Houses	Structures	130,479,359
	Machineries	32,601,771
	Doors & Wind.	27,668,298
	Finishings	48,313,468
Totale for Houses		239,062,897.00
Walls		11,289,399
Urbanization		15,636,191
Green Works		1,663,394
Furnitures		878.970
TOTAL		**385,551,930.00**

8. GENERAL ADVANCEMENT			Inhabitants allocable
Plates started (begin of the digging works)	182	99%	15.913
Plates with finished digging	182	99%	15.913
Plates with foundations laid	181	99%	15.825
Finished Plates	175	96%	14.339
Plates consigned to the next working step	164	90%	14.339
Houses started	161	88%	14.077
Houses having completed structures	129	70%	11.279
Finished Houses	50	27%	4.372
Furnished Houses	43	23%	3.760
Houses allocated to inhabitants	37	20%	3.235

PS: plates whose measures are equivalent to circa 57x21 metres

Source: Forcase/Eucentre.

Figure 5: **Examples of Cartographical Representation of Real Estate Aggregates, L'Aquila, January 2013**



Source: Reconstruction City Map of L'Aquila, January 2013.

Figure 6: Damage Classification in the USRA Instructions Manual

- **D1** light damage: no structural damage and negligible non-structural elements; capillary cracks in a few wall panels; small pieces of plaster fallen, and in rare cases falls of high parts of buildings.
- **D2** non-structural moderate damage, cracks to walls, falls of quite large pieces of plaster, partial collapse of flues.
- **D3** medium damage with wide cracks in diverse wall panels, damage to cornices, collapse of non-structural elements.
- **D4** serious damage to structure, collapse of portions of walls, partial collapse of cornices and slabs.
- **D5** very serious damage to structures, close to collapse or total collapse.

				
D1 - light damage	D2 – medium-moderate damage	D3 – medium-serious damage	D4 – serious damage	D5 – very serious damage

	
Medium-serious damage D2-D3: Damage mechanism found with high frequency. X-Cracks in the walls or in inter-floor bands.	**Medium-serious damage D2-D3:** Masonry maintains bearing capacity even in the presence of wide cracks.
	
Very-serious damage D4-D5: Macroscopic dislocations of structural components. Partial or total collapse.	**Very-serious damage D4-D5**: transversal cracks in the main walls.

Source: USRA, SEISM Abruzzo (2009), Instructions Manual (2013, pp. 20, 21, 32).